DOCUMENT RESUME

ED 232 687 IR 050 334

AUTHOR Wright, H. Curtis
TITLE The Myth of Scientific Sufficiency in Librarianship.
PUB DATE 17 Mar 83
NOTE 21p.; Paper presented at the Annual Conference of the Utah Library Association (Salt Lake City, UT, March 17, 1983).
PUB TYPE Viewpoints (120) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Communication (Thought Transfer); *Information Theory; *Library Science; Systems Analysis
IDENTIFIERS *Symbolic Interactionism

ABSTRACT

Postwar librarians have sacrificed the humanistic basis of librarianship and regard the use of science in librarianship as a settled issue. American librarianship is currently dominated by the physical thinking of scientific systems theory, which includes Bertalanffy's general system theory, Wiener's cybernetics, and the Hartley-Shannon theory of information. It is therefore following the wrong theoretical perspective on human communications, because librarians must deal with the subjective immateriality of ideas, whereas systems theory is concerned with the controlled movement of physical signals from one place to another. But symbolic interactionism, the humanistic alternative to the scientific view of human communications, concentrates on the psychophysical interplay of physical signals with their ideative referents. Librarians should turn to this latter perspective on communications theory because the relationship between a physical symbol and its nonphysical referent is inherently metaphysical, which explains why science is utterly incapable of resolving the specifically philosophical problems of human symbolism. The mysteries surrounding the communication of information can never be resolved unless the physical presuppositions of science are abandoned. (Author/ESR)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED232687

U.S. DEPARTMENT OF EDUCATION
NATIONAL INSTITUTE OF EDUCATION
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☑ This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official NIE position or policy.

THE MYTH OF SCIENTIFIC SUFFICIENCY IN LIBRARIANSHIP

by

H. Curtis Wright

IR050334

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

H. Curtis Wright

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

ERIC Clearinghouse on
Information Resources
Syracuse University
School of Education
Syracuse, N. Y. 13210
(315) 423-3640

AUTHOR ABSTRACT
(To Accompany Document Submitted to ERIC/IR)

Author: H. Curtis Wright

Title: The Myth of Scientific Sufficiency in Librarianship

Abstract (up to 200 words): American librarianship is currently dominated by the physical thinking of scientific systems theory, which includes Bertalanffy's general system theory, Wiener's cybernetics, and the Hartley-Shannon theory of information. It is therefore following the wrong theoretical perspective on human communications, because librarians must deal with the subjective immateriality of ideas whereas systems theory is concerned with the controlled movement of physical signals from one place to another. But symbolic interactionism, the humanistic alternative to the scientific view of human communications, concentrates on the psychophysical interplay of physical signals with their ideative referents. Librarians should turn to this latter perspective on communications theory because the relationship between a physical symbol and its nonphysical referent is inherently metaphysical--which explains why science is utterly incapable of resolving the specifically philosophical problems of human symbolism.

****
Information About Document
****

Paper presented at: The Academic Libraries Section of the Utah Library Association's Annual Conference, 17 March 1983, Salt Lake City, Utah.

Project Report (Contract Information, if possible)

Journal Article (Complete Citation)--(Some journals do not appear in CIJE)

Other

052334

THE MYTH OF SCIENTIFIC SUFFICIENCY IN LIBRARIANSHIP

By H. Curtis Wright

> Science has ... been so successful that is has ... earned a great and strange reputation. If it has never yet been defeated, presumably it is all-powerful. And since science is, after all, the work of scientists ... then presumably these scientists are both so clever and so wise that they can do anything. Perhaps we should turn the world over to this superbreed.... Perhaps they could solve all problems of human relations, of economic stability, of international peace, and of the good life. Perhaps they should design not only the churches, but the creeds also. Perhaps the best music and ... poetry will, in a short time, come out of a machine. The sad fact is that some scientists themselves appear to believe precisely this. And this arrogant attitude ... irritates, or even angers, the social scientists, the humanists, the moralists, and the creative artists.
>
> Warren Weaver[1]

Winston Churchill once asked an English gentlewoman in Parliament if she would participate in what he called "meretricious relations" for something like $850,000. When he saw that she was considering it, he asked if she would do it for $20. She replied: "Of course not! What do you think I am?" To which he replied: "That's already been decided; we're just haggling about the price."[2]

This story, which is doubtless apocryphal, illustrates an important point. If you question the use of science in librarianship today, you find that most librarians regard it as a settled issue. If that issue has already been settled, however, there's nothing left to do except haggle about the cost of using it. "The librarians talk glibly of library science, and indeed strive to endow it with scientific principles." But they ignore the double fact that librarianship "has emerged from a humanistic tradition," and that "its fundamental concern is with the communication of ... ideas," not with the transmission and reception of signals.[3] Librarians have traditionally confused their humane concern for the intersubjective communication of ideas with the objective problem of transporting physical symbols through time and space. Since World War II, however, they have pushed this confusion to its ultimate limits. "The humanistic basis [of librarianship] is there," says Abraham Kaplan, "and will and must remain as a basis."[4] But the postwar librarians have taken a different view: they have sacrificed their essential humanism on the altar of high technology by capitulating to systems theory, the scientific way of accounting for human communications; and they know virtually nothing about symbolic interactionism--a very real alternative to systems theory, which provides the humanistic account of communications. There are thus two theoretical perspectives on the same thing, for systems theory and symbolic interactionism are not merely rival theories of

communication: they are radically different approaches to the whole problem of theorizing about human communications. The scientific and humanistic perspectives thus constitute the necessary dipoles of communications theory which serve as the general orientations for all possible theories of communication; and it is not going to far to say that every single theory of communication known to date is built on one of these two perspectives or is a combination of both. It is clear, therefore, that general systems theory, which deals with the controlled manipulation of physical symbols, can never replace symbolic interactionism, which investigates the psychophysical interplay of physical symbols with their ideative referents.[5] It is also clear that the librarian's enthusiastic endorsement of the former and continuing indifference to the latter are grossly and thoroughly indefensible.

In order to counteract the foregone conclusion that science is the only hope of librarianship, it is necessary to review some obvious facts whose implications are apparently not so obvious to the librarians. Information science is based on the instrumental thinking of scientific matter-philosophy, whereas librarianship is founded on form-philosophy. The failure of librarians to realize this has exposed librarianship to all of the perils of instrumental reasoning outside of science. General system theory, cybernetics, and information theory are all included in systems theory, which is derived from the physical thinking of scientists like Bertalanffy, Wiener, Shannon, Weaver, von Neuman, and Morgenstern.[6] A close look at systems theory reveals the physical nature of its three components. (1) General system theory was never intended for application to formal disciplines like history, literature, philosophy, or the arts. It is described as "a new scientific discipline" by its founder, the biologist Ludwig von Bertalanffy, who calls it "a logico-mathematical discipline, in itself purely formal but applicable to the various empirical sciences."[7] The Society for General Systems Research, which was founded by Bertalanffy, has also stated, in the first issue of its journal, that "most systems in which we are interested consist of physical parts: atoms, stars, switches, masses, springs, wires, bones, neurons, genes, muscles, gasses, etc."[8] (2) Cybernetics attempts to control the physical behavior of mechanical systems, including the behavior of biological and social systems.

> Cybernetics ... is a 'theory of Machines', but it treats ... ways of behaving.... It is thus essentially functional and behaviouristic.... Cybernetics deals with all forms of behaviour in so far as they are regular, or determinate, or reproducible.... Cybernetics stands to the real machine--electronic, mechanical, neural, or economic--much as geometry stands to the real object.... It takes

> as its subject-matter the domain of 'all possible machines'.... What cybernetics offers is the framework on which all individual machines may be ordered, related, and understood.... [It] treats any given, particular machine by asking ... 'what are all the possible behaviours that it can produce?'[9]

(3) Information theory concentrates on the sending and receiving of electronic signals, and "is not concerned with information at all--in the ordinary sense." It is therefore "concerned with only the technical problem of getting symbols ... from one place to another without distortion," and "does not relate directly to the interpretation of those symbols. This has been a severe disappointment to many people and may be the primary reason for the sneers that sometimes appear when information theory is mentioned."[10] But modern electronics has virtually eliminated "noise" from the transmission of signals. In a sense, then, "the theory is obsolete, for the technical ... problem it has solved no longer exists." In a deeper sense, however, "the theory was never quite applicable to human communication systems," according to Darnell, because Shannon, who completely excludes human communicators from his mathematical model of human communications, "made some assumptions [about the mechanical senders and receivers of information] that are not exactly tenable for human systems." Darnell is even inclined to say that "the mechanistic view of communication ... has caused two problems for every one it has solved."[11] It is "stuck," for example, with the base 2 logarithm and the binary digit (bit). Since an off-on switch can "choose" only one of two equally probable alternatives, it must transmit one bit of "information" for every "choice" it makes. So, the scientific use of bits and base 2 logarithms is not arbitrary. "It fits right into ... an electrical engineer's way of thinking"--which also happens to be the computer's way of thinking. "It will fit right into your way of thinking, too, if you will think of communication as a game of twenty questions" and submit yes-no choices to the computer's off-on switches until you figure something out.[12] You can forget it, though, if you prefer thinking to figuring, because "95% of [today's] computer use lies in chewing up numbers and spitting them out."[13] Despite all the optimistic predictions, therefore, information theory is severely limited in its potential. Its purpose is to create a mechanical system which functions as the means of providing access to ideas; but the design, production, implementation, and control of the system get all of its attention. The schools of librarianship and information science are therefore turning out "control artists"--the data mechanics who tinker with information systems but stumble over the access problem because they can't control ideas. The reductive temperament of science, meanwhile, acknowledges no essential difference between data and ideas because it hates dichotomies and dualisms--

like the psychophysical philosophy of mind-brain interactionism discussed at such great length by Karl R. Popper and John C. Eccles.[14] The resulting monistic confusion of data with ideas, however, can only be dispelled by distinguishing between data systems and idea systems. Our so-called "information systems" are really data systems, according to Thayer, because they "map the flow of data to and from humans or machines."[15] We therefore "need to distinguish between information systems [which cannot communicate ideas] and communication systems [which do not communicate data]:" they are clearly different things, because a communication system can exist as an idea system only if the output of some data system is subjectively interpreted by the self-conscious intelligence of a human being.[16]

The scientific lust for data, furthermore, has converted the linguistic concept of information-as-ideas into the mathematical concept of information-as-data. "This technical concept of information," which was invented by telephone engineers, "was crucial ... [for resolving] the technical problems of symbol transmission through noisy channels;" but it has never had anything to do with information as librarians understand the term.[17] In Miller's magnum opus, for example, "information" is always utilized "in the technical sense first suggested by Hartley in 1928, and later developed by Shannon in his mathematical theory of communication. It is not ... information as we usually understand it.... Information [in the technical sense] is a simpler concept," which always refers to "the degrees of freedom that exist in a given situation to choose among signals, symbols, messages, or patterns to be transmitted."[18] The physical symbol, in other words, has no symbolic referent in Hartley's technical concept of information, which "relates only to the signs themselves and does not relate to what they 'mean'." Like Miller and others who followed him, Hartley defined information as the transmitter's "successive selection of signs, rejecting all meaning as a mere subjective factor" and insisting that "the signs must not be confused with the things they 'stand for.'"[19] Small wonder, then, that information has been described as "the inverse of predictability," something that "corresponds to surprise and uncertainty.... Information is what you don't know ... is going to happen next."[20] But this way of thinking about information, which is fully compatible with the scientific thinking "commonly used in the description and analysis of human behavior," has nothing whatever in common with thinking about ideas.[21] It was originally advocated--in completely physical terms--by Hartley, who, "in estimating the capacity of the physical system to transmit [what he called] information," argued that "we should ignore the question of interpretation," because "by this means the psychological factors ... are eliminated and it becomes possible

to set up a definite quantitative measure of information based on physical considerations alone.[22] That was good science, perhaps. But philologically speaking, it also drastically overhauled the commonly accepted meaning of "information" to fit the requirements of a new scientific theory.

> The layman needs to be told about the language of physical thoeries. When a theory is developed, all kinds of [ordinary] phrases ... are given a [technical] use, many familiar terms acquire fresh meanings, and a variety of new terms is introduced to serve the purposes of the theory. A scientist ... becomes accustomed to using the novel technical terms and the everyday-sounding phrases in the way required [by the theory]; but he may only be half-aware of what is happening ... [as] the building of the language of the sciences is not entirely a conscious process.... He may unwittingly use ... terms and turns of phrase which can be understood properly only by someone already familiar with the theory.[23]

That is precisely what happened with the rise of information theory: information as the invisible structure of thought suddenly became information as the observable functions of matter-energy; and a word was no longer an abstraction with meaning, but "an acoustic or electrical disturbance which may be expressed as ... an oscillographic record of a speech sound."[24] This is the technical concept of information later developed by Shannon and Wiener, and refined by McGill and Ashby.[25] "It is a pity," Cherry laments, "that the mathematical concepts stemming from Hartley have been called 'information' at all,"[26] as that is what reduces the study of mind to action theory: thought becomes process so scientists can live with it. And live with it they have, for by and large, today's information professionals are scientists who define information as "a property of data ... produced by a process that produced the data." Their physical thinking is transparent and complete, for "the [information] process may be simply <u>data</u> transmission ...; it may be <u>data selection</u>; it may be <u>data organization</u>; it may be <u>data analysis</u>."[27] But data it must be, one way or another, or it isn't information. And the librarians have followed suit in this; but they, of all people, should know that "information theory is not 'where it's at'--is not the central concern of today's study of communication."[28] Shera saw clearly that "the study ... of knowledge, and the relationship between the [noetic] structure of knowledge ... and the librarian's tools for intellectual access to that knowledge, have received almost no attention and certainly no real exploration."[29] Information science is concerned with "the effectiveness of ... communications channels in society" and does not address the unsensed realities of knowledge "and the impact of that knowledge on its coeval culture." The information scientists, moreover, are "aligning themselves with the natural sciences, which deal with physical phenomena," whereas the librarians must "deal with ideas and knowledge and their

communication; hence librarianship is much closer to the humanities than to the 'hard' sciences."[30] A system of human communications, remember, is always defined by the subjectivity of its users; and human subjectivity is the one thing science cannot study objectively. Nevertheless, "it is the receiver who causes messages to have their meaning and significance and ... to have effects upon him."[31] In any system, therefore, if "the primary focus is upon the mechanical flow of messages"--even if human beings are found among its components--"it would still be termed an information system" which, by the technical definition of information as matter and energy, can transmit the physicality of data but cannot communicate the immateriality of ideas.[32] Systems theory thus investigates the mechanical transmission of information-as-data; but librarians must live with the communication of information-as-ideas, which can only be accomplished by the symbolic interaction of data and ideas. "Because ... communication is carried out through symbolic representations," Shera tells us, "the problem of ... symbolization lies at the very heart of what the librarian is trying to do."[33] The human use of symbols, furthermore, is "the keynote of all humanistic problems." It probes the depth of our subjective questions, "instead of obscuring them as traditional 'scientific methods' have done."[34] The philosophical study of symbolism "is not a technique borrowed from other disciplines ...; it has arisen in the [humanistic] fields that the great advance of [scientific] learning has left fallow."[35] It concentrates on the utilization of physical data as the only means of communicating thought. "So our interest in the mind has shifted ... from the [scientific] acquisition of experience," which is accomplished by analyzing the data of sensation, "to the [human] uses of sense-data," which constitute the mind's way of sharing ideas with other minds.[36] This philosophy of symbolism clarifies the instrumental function of the physical datum in human communications. It also resurrects the old idea-concept of information and reminds librarians that "their primary concern is with ideas," not with physical objects and processes.[37] They should therefore reject the data-concept of information, while retaining a legitimate secondary interest in data as communicative instruments. For "information is not something which inheres in the objects and events of man's world." On the contrary, "information is what a man endows those objects and events with. Man literally in-forms himself.... Information is thus ... his awareness, his consciousness, his knowledge."[38] The technical and linguistic concepts of information thus have very different functions, the former in the analysis of behavior and the latter in the communication of ideas. Both concepts can be very useful--but only "if we can avoid getting burned by the short circuit between two kinds of information."[39]

The question facing librarians today is not: "Is science relevant to librarianship?" The question is: "What kind of relevance does science have for librarianship?" And the answer is that the proper role of science in librarianship is instrumental to the functions and subservient to the purposes of the library profession. Science can help librarians with their communicative tooling, in other words; but that's all it can do for them, because science belongs in the toolbox--not in the driver's seat--of the profession. Information science, however, has never accepted the instrumentality of science in librarianship. It therefore rejects even the slightest hint of an ancillary role for the functions of science, and asserts the scientific doctrine of instrumental reasoning as a means of subordinating librarianship to its own functions and purposes. The result is a power struggle in which information science has emerged victorious, and librarianship has been subjected to the indiscriminate pursuit of scientific objectives for their own sake. Librarianship is currently selling out to information science in all of this; and the librarians are fast forgetting, if they have not already forgotten, that "science is a subculture among subcultures,"[40] that it is only one way of thinking about the world, and that there are indeed other ways of thinking and other things to think about.

To what shall we liken the indiscriminate use of instrumental reasoning in librarianship? It is, I think, like using the cannon in the Civil War: everybody used it (from the highest general to the lowliest recruit), nobody wondered whether it should be used or not, and it didn't matter which side of the war you were on. The only questions to arise about the cannon, since the decision to use it had already settled the basic issue of means, were disputes about rationally defensible ends. Men could not agree on what to use the cannon for; so they argued over where to put it, what to point it at, when to fire it off, and how to maximize its efficiency for the most effective use. And they settled those arguments on the battlefield, their Court of Last Resort, by appealing to self-interest, the most powerful reasoner of all.

This 19th-century reasoning, which is far from dead today, is essentially instrumental and utilitarian. It began with early modern scientists, like Newton and Galileo, who reduced all human thinking to an intellectual strategy for understanding and controlling the natural order. It was formulated as the scientific doctrine that knowledge is instrumental by Francis Bacon, for whom knowledge of the world meant power over the world.[41] But the influence of instrumental thinking, which profoundly affects every aspect of modern culture, has been more baneful than beneficial in dealing with the ethical and social conditions of human life and its

institutions. The impact of science on the law is a case in point, for legal instrumentalism has turned the lawyer into a kind of legalized hit-man, a hired gun for anyone who wants to control the social order.[42] Scientific reasoning, in other words, has transformed the law, which used to be a defensive weapon for the protection of society, into an offensive weapon for the systematic exploitation of society.[43] If Blackstone and the 18th century viewed the law as a shield for protecting human rights against encroachments by the government, Bentham and the 19th century used it as a sword for hacking their way to socially desirable goals. Law in the 19th century, that is to say, was just like the 19th-century cannon in the Civil War. Blackstone, who believed that law was the basic substance of social order, also believed in the rule of law, which established and maintained order in society; but Bentham, who regarded the law as an instrument of social control, wanted to rule by law, not to be ruled by it. Newton tried to understand the natural order in order to control it; and Bentham, who wanted to become the "social Newton," used the law as a club for bludgeoning the social order into submission.[44] The result is interesting. Knowledge <u>is</u> instrumental in science; but the perils of instrumental reasoning in the law are obvious to anyone who will look. Legal instrumentalism is simply wrong: if you can't see because you're in the dark, it doesn't help one bit to call the darkness light; and following everyone else into the sea doesn't help either. Lawyers as hired guns "are specialists in [social] manipulation, and are consistent with the instrumental approach to law. But they present serious moral difficulties," because "the role of the 'hired gun' forces the potential lawyer to visualize himself as an intellectual prostitute.... If the lawyer is going to live with himself, the system seems to say, he can't worry too much about right and wrong."[45] He therefore worries about winning and losing--and goes through law school to have his conscience removed so he can feel good about arguing for a living. Blackstone may have erred by moralizing the law; but we <u>use</u> the law to legalize moral issues. Cretins with money can hire gunslingers to get their way, for the law is open to everyone, "as are the doors of the Ritz Hotel."[46] But a government of laws and not of men is possible only in the Blackstonian sense in which the law is substantive; for if the law becomes a cannon, the cannoneer becomes a ruler--until the cannon is turned on him. In the Benthamite system, where the law is demoted to instrumental status, the rule of law is reduced to administration, the lowest form of lawyering. And the 20th-century lawyer no longer sees any difference between the two, because society is ruled by moneyed self-interest and the rule of law has become an incomprehensible concept.[47]

The most brilliant failure of librarians to date is the inability to distinguish their substance from their instruments. It is reflected in their similar failure to understand the difference between the physical datum and the metaphysical referent, which is commonly known as an idea. The factual datum is indispensable to the human study of anything outside one's own consciousness. It plays two informational roles, however, which are constantly confused: it functions in science as the substantive id quod, that physical entity which is studied; but in metaphysics it becomes the instrumental id quo, that physical entity by means of which ideas are studied and communicated. The factual datum is therefore essential in creating and communicating both the physical concepts of science and the formal images of the humanities. The only issue here "is the nature of the relevance," since "facts ... are as relevant to metaphysics as to experimental science, but not in the same way:" they are "instrumental to the discovery of metaphysical truth," but "constitutive as evidence ... [in] experimental science."[48] The continuing rivalry of conceptualists versus behaviorists in all of the social sciences, moreover, reflects our modern ambivalence about the factual datum in the study of man. Is man a mechanics of atoms, or a thinking apparatus? Should we study his behavior substantively, like the scientists, with no regard for his mind? Or instrumentally, like the humanists, as a means of insight into his mind?[49]

The study of physical realities, in which knowing is instrumental to experience, is virtually never distinguished from the study of ideas, in which experience is instrumental to knowing and to communicating what is known. In medicine, for example, there is "a great gulf fixed between the 'scientific' and the 'medical' studies of the young physican and surgeon," precisely because the medical profession makes no attempt "to distinguish between what we [physicians] observe in persons who are ill ..., and the general notions we form [as disease-concepts] ... for purposes of communication."[50] This distinction is basic, however, for we can neither think nor communicate thought without utilizing common nouns, abstractions representing nothing real except the concrete instances which exemplify them. The name of a disease, like lupus or diphtheria, "is a perfect example of a general term covering a set of particular cases none of which are exactly alike." Nevertheless, a disease "is commonly spoken of as an absolute, a thing which exists in its own right." But there are no diseases; there are "only sick people, no two of whom have exactly the same symptoms."[51] That is why "no great advance is probable in ... Medicine until the belief in the real existence of diseases is abandoned."[52] Diseases, that is, are not objective realities that we "catch:" they do not attack us when the climate changes, and we

can't ward them off with missles or barbed-wire barricades. "Only in recent time has it been widely recognized that ... [diseases] have no separate self-subsistence but are simply abstractions from experience."[53] Thus, the names of diseases are simply the names of ideas which enable physicians to discuss the realities they observe in sick people. This distinction, though basic, remains controversial among physicians, "for only 'mad doctors' may ... dabble in philosophy without loss of their reputation as practitioners!"[54] Confusion about the real nature of diseases is therefore rampant in medicine, and can only be eliminated by separating medical data from ideas about medicial data. This separation, however, always polarizes the practitioners and educators of medicine, because the former can only treat sick people in the real world whereas the latter must work with diseases as abstractions in the world of ideas.[55]

> All teachers and professors of Medicine ... are dependent in the communication of their researches to their fellows and of instruction to their pupils, upon the use they make of Symbols, and upon ... the difference between Thoughts and Things.... [But] few [physicians] now comprehend the distinctions between Words, Thoughts, and Things, or the relations engaged between them when statements are communicated.[56]

This communicative predicament is fully generalizable, for the difference between studying the physical datum itself and using the physical datum in order to study ideas is absolute. It is one thing to learn the truths of science; but communicating what has been learned, whether scientifically or otherwise, is an entirely different matter.

The metaphysical referent constitutes the difference between the physical datum-as-symbol and the physical datum per se. The symbolic datum, in other words, always refers the mind to an idea. Relating one physical datum to another is a scientific problem; but science cannot manage metaphysical referents, which are related to physical data only by convention, not by nature. The metaphysical interplay of sensible data with unsensed ideas thus mediates all forms of communication both to and from the intellect, whether the messages communicated are behavioral, cultural, mathematical, verbal, or whatever. "Human interaction is essentially symbolic interaction. Nearly every movement, sound, odor, or touch of another human being acts as a symbol which we learn to interpret." And because the metaphysical meanings of any symbolism must be learned, the problem of communicating is "similar to the work of cryptographers. Each [communicant] seeks to discover the rules used to convey information [by means of symbols] and thus to crack the code someone else is using."[57]

> A ... consequence of using symbols as a code for what we know is the ability to communicate. Much of our knowledge can be converted into ... stimuli which others can perceive. We can move our bodies in ways that can be seen.... It is possible to make noises.... The environment can be manipulated to create sensory information for others to perceive. Any of these humanly-produced stimuli can be employed as symbols which represent what we know. For communication to occur, it is necessary that others learn the same rules for attaching these stimuli to the appropriate concepts.[58]

But none of this can be accomplished unless the physical datum functions instrumentally (and invisibly) as a symbolic sign: it must present its idea to the mind without getting in the way.

> If some object [or process] is to act as a sign, the interpreter must shift attention from ... [itself] to its referent. Every stimulus ... provides us with information about itself. [But] a sign ... results in two types of knowledge--that which is intrinsic (knowledge about the sign) and that which is not (knowledge about the referent).... This shift of attention is produced unconsciously.... Our attention is so thoroughly focused on the referent that signs are [wrongly] said to take on the meaning of that which they refer to.[59]

The problem of relating meanings to data is metaphysical, not scientific. The mind, that is, interprets the symbolic datum extrinsically, in terms of its referent; but science can only interpret it intrinsically, in terms of its own nature. Every human being, including the scientist (who is always a person before he is a scientist), uses the physical datum for communicating his ideas, even if he does not understand it scientifically. The scientist qua scientist, however, who cannot study the metaphysical aspect of information at all, investigates only the physics of informational expression--the sounds of speech, the shapes and sequences of characters, the tappings of Morse code, and so forth. But the knowledge thus derived is never substantive in communicative matters as it is in science; it is always intrinsic to the datum and therefore strictly instrumental, as is the datum itself. "Sense knowledge is either instrumental [to the recognition of ideas] or it is not." This fact often escapes the scientist, who may honestly believe, for example, that he is studying music when he is actually studying musical acoustics. "If sense knowledge is instrumental, then it is a means by which we know things [i.e. forms, ideas]. If it is not instrumental, then the sense object is that which is known." But "one kind of knowledge cannot be partly instrumental to ... other kinds of knowledge.... It is wholly so, or not at all."[60] The physics of sensation constitutes the necessary condition for human communications, the indispensable means of recognizing all ideas except one's own; but the sufficient condition can be met only in the mind's metaphysical recognition of the ideas symbolized by sensation. This is something no machine can do, for there is no artificial intelligence:

the only intelligence which exists at all is the natural attribute of individual human minds. The physical means of recognition and the metaphysical referent which is recognized have no natural relationship for science to discover. And "because symbols are arbitrary, any stimulus can represent any conceivable entity in [or beyond] the universe."[61]

> Knowledge is what somebody or something [called a mind] knows, and ... without a knower knowledge is an absurdity.... Knowledge is [not] simply an arrangement of neuronal circuits or brain cells.... It is, of course, an article of faith among physical scientists that there must be somewhere a one-to-one correspondence between the structures of the physical body and the structures of knowledge.... There is nothing like empirical proof or even very good evidence for this hypothesis.... If there is a physical and chemical structure corresponding to the knowledge structure, it must be ... [something] we do not understand. It may be, indeed, that the correspondence between physical structure and mental structure is something that we will never be able to determine.[62]

The mysteries surrounding the communication of information can never be resolved unless the physical presuppositions of science are abandoned. The scientific modes of thinking are all precluded by the instrumental function of symbolic data: the physical datum may be what you study in science, but whenever people communicate it becomes the means of studying ideas. The instrumentality of data in human communications absolutely contradicts the instrumentality of knowledge in science. Either doctrine of instrumentality is appropriate in its own sphere; but neither is appropriate everywhere and nobody can have it both ways at once. If the instrumentality of data is unacceptable to scientists for whom data are substantive, the instrumentality of knowledge is equally indefensible for librarians whose substance is ideas. Data and ideas can be mixed mechanically, like salt and pepper; but not chemically, like hydrogen and oxygen. The substance of this <u>mixis</u> is always the dominant element, to which the subdominant additive is instrumental. If you add ideas to data, therefore, you get a science; but data added to ideas spells metaphysics every time because formal substance, though thinkable, cannot be sensed. The human mind, which is both the source and the subject matter of librarianship, "is distressingly invisible, and a science with invisible content is likely to become an invisible science."[63] Librarianship is precisely that, an invisible science of the mind and its ideas. And that, I think, is also the best of all possible definitions for a metaphysics. Information is a metaphysical ghost, like the invisible man of bygone television, who can only be detected from his physical manifestations--like his voice, the clothes he wears, a sock on the jaw, impressions in the chair or rug, the food he eats, his breath on a wintry day, or the cigarette he smokes.

Data processing, finally, should never be confused with the processing of information. The former can be done by machines; but only the human mind, which is not merely a complicated machine, can do the latter. Information science is presently data science. But it must become an idea science in order to realize its full potential, because in-FORM-ation is form, not matter;[64] and information science therefore belongs to humanistic form-philosophy, not to scientific matter-philosophy. There is more to the management of information than pushing characters around, even if your bulldozer is a computer operated by Speedy Gonzales. The communications process is an intersubjective transaction in which ideas are represented by and inferred from an instrumental physics of expression. It cannot be understood objectively through any explanation of data based on science. Or, to put it another way, you don't think about data while communicating. Failure to realize this always ends, as today's librarians have ended, with "data data everywhere, and not a thought to think"[65]--except about data.

NOTES

The Myth of Scientific Sufficiency in Librarianship

[1]Warren Weaver, "The Imperfections of Science," American Scientist, 49 (1961), 101. Italics his.

[2]This story comes from a class in "Legal and Intellectual History" taught by professor Stephen M. Fuller. Dr. Fuller and I have discussed the relationship of the histories of law and librarianship both to each other and to intellectual history in general. He has been my informant for the discussion of law which follows, and for some extremely pertinent references to the legal literature.

[3]Jesse H. Shera, "Philosophy of Librarianship," ALA World Encyclopedia of Library and Information Services, eds. R. Wedgeworth [and others] (Chicago: American Library Association, 1980), 315, adding that, because the intangibles of thought "are embodied in physical objects ... it is easy to mistake the physical object ... as the [librarian's] reality." Italics mine.

[4]Abraham Kaplan, "The Age of the Symbol ...," in Don R. Swanson, ed., The Intellectual Foundations of Library Education ... Chicago: Univ. of Chicago Press, 1965), 12.

[5]See Stephen W. Littlejohn, Theories of Human Communication (Columbus, Ohio: Charles E. Merrill, 1978), chaps. 1-3, 6. On the humanistic basis of symbolic interactionism see ibid., 56; H. Blumer, Symbolic Interactionism; Perspective and Method (Englewood Cliffs, N.J.: Prentice-Hall, 1969), 21n.; and J. F. Glass and J. R. Staude, eds., Humanistic Society; Today's Challenge to Sociology (Pacific Palisades, Calif.: Goodyear, 1972), 185.

[6]B. D. Ruben, "General System Theory," in R. W. Budd and B. D. Ruben, eds., Interdisciplinary Approaches to Human Communication (Rochelle Park, N.J.: Hayden Book Co., 1979), 96-97.

[7]Ludwig von Bertalanffy, General System Theory; Foundations, Development, Applications (New York: G. Braziller, 1972), 37.

[8]A. D. Hall and R. W. Fagen, "Definition of System," General Systems, 1 (1956), 18. Our present understanding of general system theory is largely derived from this society and its official journal, both founded by Bertalanffy.

[9]W. Ross Ashby, An Introduction to Cybernetics (New York: Wiley, 1956), 1-3.

[10]D. K. Darnell, "Information Theory: an Approach to Human Communication," in R. W. Budd and B. D. Ruben, eds., Approaches to Human Communication (New York: Spartan Books, 1972), 158.

[11]Ibid. Shannon's assumptions about the actual and attributed choices of the human and electronic senders and receivers of messages are criticized in ibid., 160-61. Cf. R. L. Ackoff and F. E. Emery, On Purposeful Systems (Chicago: Aldine-Atherton, 1972), 11: "Humans are typically treated by systems researchers as machines, or as entities that respond to stimuli in a mechanical way. Sometimes the human is completely excluded. In his model of the communication process," for example, "Shannon excludes the human communicator.

[12]Ibid., 159. On bits and binary digits cf. J. G. Miller, Living Systems (New York: McGraw-Hill, 1978), 11-12. This massive work answers every question anyone can reasonably ask about systems theory.

[13]Herbert Simon, "Automation, Knowledge and Society," Scholar and Educator, Fall, 1981, 10.

[14]In their The Self and Its Brain (New York: Springer-Verlag, 1977), passim, and elsewhere. Psychophysical interactionism is acknowledged by Popper to be similar to the ideas of George Herbert Mead, the originator of symbolic interactionism, ibid., 111 and n.7.

[15]Lee Thayer, Communication and Communication Systems ... (Homewood, Ill.: Irwin, 1968), 116. Italics his.

[16]Ruben, "General System Theory," 109. Cf. Thayer, Communication and Communication Systems, 116-17.

[17]Darnell, "Information Theory," 159-60.

[18]Miller, Living Systems, 11. Italics mine.

[19]Colin Cherry, On Human Communication; a Review, a Survey, and a Criticism (3d ed.; Cambridge, Mass.: M.I.T. Press, 1978), 50-51.

[20]Darnell, "Information Theory," 158-59. Italics his.

[21]Ibid., 160. Italics mine.

[22]R. V. L. Hartley, "Transmission of Information," Bell System Technical Journal, 7 (1928), 538. This kind of physicalistic thinking pervades the entire article.

[23]Stephen Toulmin, The Philosophy of Science; an Introduction (New York: Harper & Row, 1960), 13.

[24]Hartley, "Transmission of Information," 542, adding that "such functions are also typical of other modes of communication."

[25]See G. Broekstra, "On the Foundations of GIT ...," Cybernetics and Systems, 11 (1980), 143; and Miller, Living Systems, 11-12.

[26]Cherry, On Human Communication, 51.

[27]Robert M. Hayes, "Information Science Education," in the ALA World Encyclopedia, 249. For another of his process-oriented definitions of information as data, see R. M. Hayes and J. Becker, Handbook of Data Processing for Libraries ... (New York: Becker and Hayes, 1970), 745-47, which I have already opposed in H. Curtis Wright, The Oral Antecedents of Greek Librarianship (Provo, Ut.: Brigham Young University Press, 1978), xvi-xvii.

[28]Darnell, "Information Theory," 158.

[29]Jesse H. Shera, "An Epistemological Foundation for Library Science," in Edward B. Montgomery, ed., The Foundations of Access to Knowledge; a Symposium ("Frontiers of Librarianship," 8; Syracuse, N.Y.: Syracuse Univ. Press, 1968), 7-8.

[30]Shera, "Philosophy of Librarianship," 316. Cf. H. Curtis Wright, "The Immateriality of Information," Journal of Library History, 11 (1976), 297-315.

[31]Ruben, "General System Theory," 108. Italics mine. "Man can and must invent whatever significances he attaches to himself, his environment, and the people in it.... How man becomes organized determines what he sees, hears, believes, comes to know--his sense of what reality is.... Man creates the reality and environment he knows," ibid., 112.

[32]Ibid., 110. "Human sensory receptors are sensitive to light, sound, and pressure--and not to reality. One hears and sees those things one has become organized to experience. Thayer's description of this parallel is a good one: 'Looking is a matter of registering light waves; perceiving a matter of having translated those light waves into an idea or image ... manipulable not by the eye but by the mind. Listening is ... registering sound waves; hearing is ... having translated those sound waves into a meaningful pattern or an image ... manipulable, not by the mechanics of the ear, but by the mind,'" ibid., 112, citing one of Thayer's unpublished papers.

[33]Shera, "Philosophy of Librarianship," 317.

[34]Suzanne K. Langer, Philosophy in a New Key ... (New York: New American Library, 1962), 32. If the humanistic study of symbols "is indeed a generative idea, it will beget tangible methods of its own, to free the deadlocked paradoxes of mind and body ... and ... overcome the checkmated arguments of an earlier [scientific] age," ibid., 32-33.

[35]Ibid., 33.

[36]Ibid. Italics hers.

[37]Shera, "Philosophy of Librarianship," 317. Italics mine.

[38]Ruben, "General System Theory," 112, citing one of Thayer's unpublished papers.

[39]Darnell, "Information Theory," 160.

[40]Kenneth E. Boulding, The Image (Ann Arbor, Mich.: Univ. of Michigan Press, 1959), 16. cf. also the rather devastating criticism of the extreme subjectivity of science in his Economics as a Science (New York: McGraw-Hill, 1970), 117-22.

[41]See E. A. Burtt, ed., The English Philosophers From Bacon to Mill (New York: Random House, 1939), xiv-xv, xvii, xx, 13, 28, 32, 38, etc.; and cf. B. D. Alexander, A Short History of Philosophy (2d ed,; Glasgow: J. Maclehose, 1908), 185: "A science which is not practically useful is in Bacon's eyes of no worth. The dominion of man ... over all things is the highest end of science. To meet the wants of life, to minister to human satisfaction, to multiply pleasure, and to increase power, that is the purpose of all knowledge.... We can only dominate things by knowing them.... All human knowledge has ultimately for its sole task to procure for man dominion over the world.... For Bacon, therefore, the interpretation of nature is a necessary condition of man's dominion."

[42]See Roger C. Cramton, "The Ordinary Religion of the Law School Classroom," Journal of Legal Education, 29 (1978), 251: "Two models of professional behavior are presented to law school students: the 'hired gun' and the 'social engineer.'" Cramton is Dean of the Cornell Law School.

[43]Thus the hired gun and the social engineer are both "technicians ... trained in the dispassionate use of legal skills for the instrumental purposes of those they serve. The hired gun gets his goals from the client he serves; the social engineer either prefabricates his own goals or gets them from the interests he serves," ibid.

[44]"Bentham's strongest intellectual commitment was to the idea of scientific method. His inspiration was derived from the success of physical scientists.... His intention was to become the Newton of the moral (and social) sciences," Douglas G. Long, Bentham on Liberty ... (Toronto: Univ. of Toronto Press, 1977), 208. For similar remarks see David Baumgardt, Bentham and the Ethics of Today ... (Princeton Univ. Press, 1952), 52, 313.

[45]Cramton, "Ordinary Religion," 259-60, adding that the social engineer who sets his own goals "contradicts ... democratic self-determination.... If he takes his values from the interest ... he represents, he suffers from the same ... characteristic of the hired gun." The social engineer, incidentally, is another monstrosity created by instrumental reasoning in the law.

[46]A. M. Carr-Saunders and P. A. Wilson, The Professions (London: F. Cass, 1964, [c]1933), 472.

[47]See discussions of "An Instrumental Approach to Law and Lawyering" and "The Instrumental Nature of Law" in Cramton, "Ordinary Religion," 250, 257-59. The historical background, which explains how things came to be this way in law, is presented in two articles by Calvin Woodard, "Reality and Social Reform; the Transition from Laissez-faire to the Welfare State," Yale Law Journal, 72 (1962-63), 286-328; and "The Limits of Legal Realism; an Historical Perspective," Virginia Law Review, 54 (1968), 689-739.

[48]W. O. Martin, The Order and Integration of Knowledge (Ann Arbor, Mich.: Univ. of Mich. Press, 1957), 105, 122.

[49]See James P. Spradley, ed., Culture and Cognition ... (San Francisco: Chandler, 1972), 52. This whole book is based on the confusion, rampant in the social sciences, which results from the modern failure to clarify the informational functions of the physical datum.

[50]F. G. Crookshank, "The Importance of a Theory of Signs and a Critique of Language in the Study of Medicine," in C. K. Ogden and I. A. Richards, The Meaning of Meaning ... (8th ed.; New York: Harcourt, Brace & World, 1959), 338-39.

[51]W. K. C. Guthrie, The Greek Philosophers From Thales to Aristotle (New York: Harper & Row, 1960), 93, adding that "the general term [for a disease] does not stand for anything real which exists over and above the individual cases. The point here is a practical one, since the careless objectifying of the disease can lead to a rigid and unimaginative approach by the physician which will be the reverse of beneficial to the patient."

[52]F. G. Crookshank, ed., Influenza; Essays by Several Authors (London: W. Heinemann, 1922), 61.

[53]Sir Henry Cohen, "The Status of Brain in the Concept of Mind," Philosophy, 27 (1952), 197. Cohen, who was delivering the Manson Lecture, also notes that "Dr. Manson ... regarded the isolation of medicine from philosophy as an unintelligible and lamentable phenomenon of our time. He wished to see philosophy restored to its ... basic role in medical education. He recognized that medicine and ... the cognate basic sciences were occupying themselves almost exclusively with ... facts, [so] that little time remained for reflection and interpretation, and for pondering on the place of medicine in ... the general corpus of knowledge," ibid., 195.

[54]Crookshank, "The Importance of a Theory of Signs," 339.

[55]"The whole history of Occidental Medicine may indeed be ... pictured as a swaying struggle between Nominalism and Realism ...; but most faithfully, perhaps as between [the practitioners of] Hippocratic Cos and [the educators of] antagonistic Cnidus.... We recognize Coans to-day amongst our wisest and best-loved physicians.... But our Cnidians and our Galens are amongst our most successful and renowned teachers.... And the same human and spiritual dichotomy may be traced in Dr. Cumston's pages, as having existed not only in Greece and Rome, but at Alexandria, at Baghdad, at Cordova, at Bologna, at Padua, at Montpellier, at Paris, at Oxford, and at Cambridge," F. G. Crookshank, "The Relation of History and Philosophy to Medicine," in Charles G. Cumston, An Introduction to the History of Medicine ... (London: Dawsons of Pall Mall, 1968), xxx-xxxi.

[56]Crookshank, "The Importance of a Theory of Signs," 340.

[57]Spradley, ed., Culture and Cognition, 16, 30.

[58]Ibid., 15-16.

[59]Ibid., 12-13. Italics mine. Three kinds of sign (icon, index, symbol), with discussions and a diagram, are distinguished in ibid., 13-15.

[60]Martin, The Order and Integration of Knowledge, 12-13, 42-43. Italics mine.

[61]Spradley, ed., Culture and Cognition, 18.

[62]Boulding, The Image, 16-17.

[63]G. A. Miller, E. Galanter, and K. H. Pribam, Plans and the Structure of Behavior (New York: Holt, 1960), 6.

[64]This is the literal significance of the Latin words informo and informatio, the former meaning "to create form in someone or something," and the latter "form that has been created in someone or something."

[65]Jesse H. Shera, "The Upside-down Library," Utah Libraries, 21 (Spring, 1978), 18, quoting a headline writer in a recent issue of the Christian Science Monitor."